

Advanced Algebra Exam Review
Chapter Seven – Radical Functions and Rational Exponents

Name

Key

If $f(x) = 2x + 3$ and $g(x) = 4x - 5$, then find the following.

1) $f(x) + g(x)$	2) $g(x) - f(x)$	3) $f(g(-2))$	4) $g^{-1}(x)$
$(2x+3) + (4x-5)$	$(4x-5) - (2x+3)$	$g(-2) = 4(-2) - 5$	$y = 4x - 5$
$6x - 2$	$2x - 8$	$= -13$	$x = 4y - 5$
		$f(-13) = 2(-13) + 3$	$x + 5 = 4y$
		-23	$y = \frac{1}{4}x + \frac{5}{4}$

Simplify.

5) $\sqrt{125x^7}$	6) $\sqrt[3]{-24a^3b^5}$	7) $(64x^4y^{-8})^{1/2}$
$5x^3\sqrt{5x}$	$-2ab\sqrt[3]{3b^2}$	$\frac{8x^2}{y^4}$
8) $\sqrt{8x^3} \cdot 4\sqrt{3x^2}$	9) $\sqrt[3]{16} \cdot \sqrt[3]{12}$	10) $(\sqrt{3} - 4)(\sqrt{3} + 8)$
$4\sqrt{24x^5}$	$\sqrt[3]{192}$	$3 + 8\sqrt{3} - 4\sqrt{3} - 32$
$8x^2\sqrt{6x}$	$4\sqrt[3]{3}$	$-29 + 4\sqrt{3}$
11) $(2 + 3\sqrt{3})^2$	12) $\sqrt{12} + 4\sqrt{75}$	13) $\sqrt{50} - 3\sqrt{32}$
$(2 + 3\sqrt{3})(2 + 3\sqrt{3})$	$2\sqrt{3} + 20\sqrt{3}$	$5\sqrt{2} - 12\sqrt{2}$
$4 + 6\sqrt{3} + 6\sqrt{3} + 27$	$22\sqrt{3}$	$-7\sqrt{2}$
$31 + 12\sqrt{3}$		
14) $\frac{\sqrt{24x^5}}{\sqrt{6}}$	15) $\frac{\sqrt[3]{128x^3y^5}}{\sqrt[3]{2x^2y}}$	$\sqrt[3]{64xy^4}$
$\sqrt{4x^5}$		$4y\sqrt[3]{xy}$
$2x^2\sqrt{x}$		

Solve.

16) $\sqrt{x-3} + 4 = 12$	17) $(\sqrt[3]{3x+6})^3 = 3^3$	18) $x^{2/3} + 4 = 31$
$(\sqrt{x-3})^2 = 8^2$	$3x+6 = 27$	$x^{2/3} = 27$
$x-3 = 64$	$3x = 21$	$x = 140.3$
$x = 67$	$x = 7$	

19) $x^2 + y^2 = z^2$ solve for y

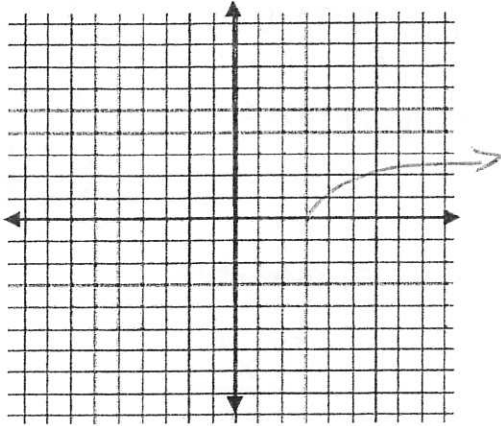
$$y^2 = z^2 - x^2$$

$$y = \sqrt{z^2 - x^2}$$

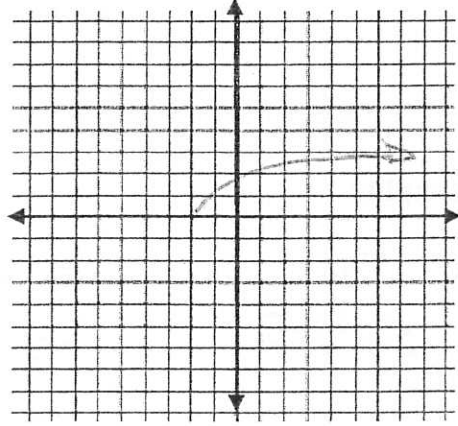
20) Graph.

- create a t-chart with at least 4 points
- plot points and sketch graph

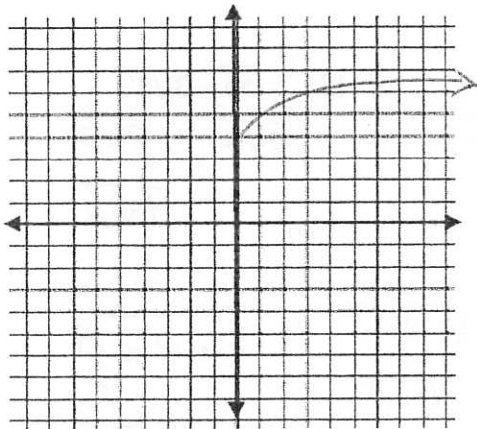
a) $y = \sqrt{x+3}$



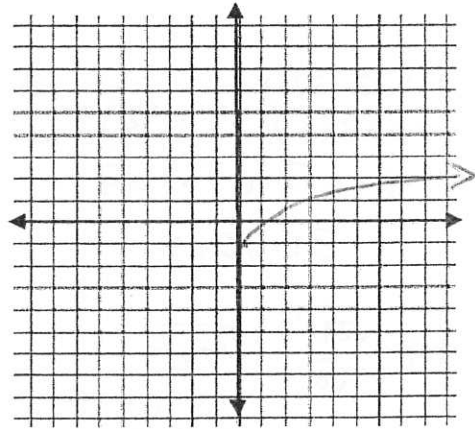
b) $y = \sqrt{x-2}$



c) $y = \sqrt{x} + 4$



d) $y = \sqrt{x} - 1$



Semester Exam Review
Exponential and Logarithmic Equations
Solve.

Name Key

Write in logarithmic form.

1) $2^3 = 8$

$$\log_2 8 = 3$$

2) $7^2 = 49$

$$\log_7 49 = 2$$

3) $216^{1/3} = 6$

$$\log_{216} 6 = 1/3$$

Write in exponential form.

4) $\log_3 729 = 6$

$$3^6 = 729$$

5) $\log_8 2 = 1/3$

$$8^{1/3} = 2$$

6) $\log 10000 = 4$

$$10^4 = 10,000$$

Solve.

7) $2^4 = 2^{x-1}$

$$4 = x - 1$$

$$x = 5$$

8) $3^{2x-3} = 27^x$

$$3^{2x-3} = 3^{3x}$$

$$2x - 3 = 3x$$

$$x = -3$$

9) $8^{x+2} = 16^{x-1}$

$$2^{3(x+2)} = 2^{4(x-1)}$$

$$3x + 6 = 4x - 4$$

$$x = 10$$

10) $(1/4)^x = 16^{x+2}$

$$4^{-x} = 4^{2(x+2)}$$

$$-x = 2x + 4$$

$$x = -4/3$$

11) $4^x = 12$

$$x \log 4 = \log 12$$

$$x = \frac{\log 12}{\log 4}$$

$$x = 1.7925$$

12) $6^{3x} = 28$

$$3x \log 6 = \log 28$$

$$3x = 1.5561$$

$$x = .5187$$

13) $3^{x+4} = 99$

$$x + 4 \log 3 = \log 99$$

$$x + 4 = 2.317$$

$$x = 1.683$$

14) $5^x - 7 = 22$

$$5^x = 29$$

$$x \log 5 = \log 29$$

$$x = 2.0922$$

15) $\log_4 x = 0$

$$4^0 = x$$

$$x = 1$$

16) $\log_x 4096 = 4$

$$x^4 = 4096$$

$$x = 8$$

17) $\log_{32} x = 2/5$

$$32^{2/5} = x$$

$$x = 4$$

18) $\log_{100} 1000 = x$

$$100^x = 1000$$

$$10^{2x} = 10^3$$

$$2x = 3$$

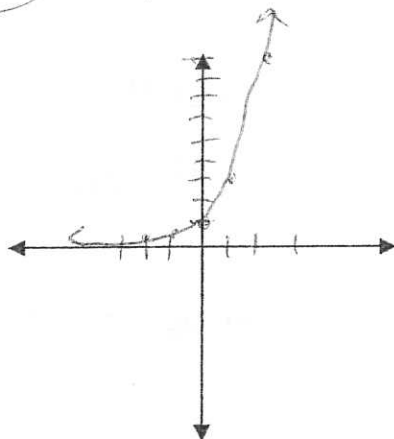
$$x = 3/2$$

19) Graph functions

- create a t-chart with at least 4 points
- sketch graph

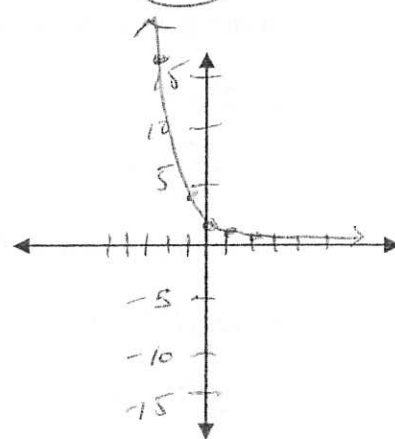
a) $y = 3^x$ Growth or decay?

x	y
-2	1/9
-1	1/3
0	1
1	3
2	9



b) $y = (1/4)^x$ Growth or decay?

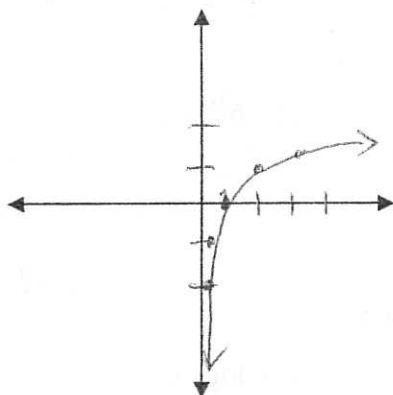
x	y
-2	16
-1	4
0	1
1	1/4
2	1/16



c) How is the graph of $y = 3(1/4)^{x+2} - 5$ different from graph b)? 2 right, down 5
x-intercept of 3

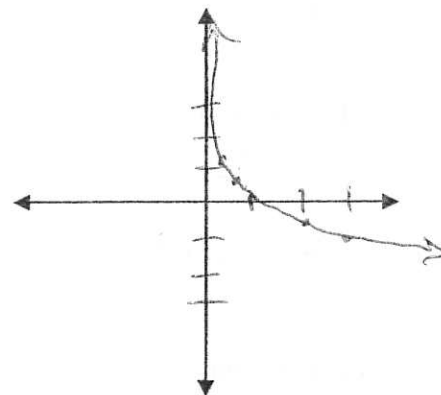
d) $y = \log_2 x$

x	y
.25	-2
.5	-1
1	0
2	1
3	1.6



e) $y = \log_{1/3} x$

x	y
.25	1.26
.5	.63
1	0
2	-.63
3	-1



20) If you invest \$2000 and earn 4% interest compounded quarterly, find the amount of money you would have after 2 years. (Hint: Use the formula: $A = P(1 + \frac{r}{n})^n$).

$$A = 2000 \left(1 + \frac{.04}{4} \right)^{4(2)}$$

$$A = \$2165.71$$

Advanced Algebra Exam Review
Chapter Nine – Rational Functions

Name Kely

Write the general equation for each.

1) Direct variation

$$y = kx$$

2) Indirect variation

$$y = \frac{k}{x}$$

3) Joint variation

$$y = kxz$$

Solve.

4) Suppose y varies directly as x. If x = 12 when y = 54, find x when y is 81.

$$y = kx$$

$$k = 4.5$$

$$81 = 4.5x$$

$$54 = k(12)$$

$$x = 18$$

5) If y varies jointly as x and z and y = 84, x = 4 and z = 3, find the constant of variation.

$$y = kxz$$

$$k = 7$$

$$84 = k(4)(3)$$

Simplify.

$$6) \frac{3x}{6x^2 - 3x}$$

$$3x(2x - 1)$$

$$\frac{1}{2x - 1}$$

$$7) \frac{4(x-3)}{4x-12}$$

$$2x - 6$$

$$2(x-3)$$

$$2$$

$$8) \frac{(x+5)(x-5)}{x^2 - 25}$$

$$x - 5$$

$$x + 5$$

Multiply/Divide. Then find restrictions.

$$9) \frac{(x+y)(x-y)}{x^2 - y^2} \cdot \frac{2(x^2 + 6)}{2x^2 + 6}$$

$$8x$$

$$2x - 2y$$

$$4$$

$$2(x-y)$$

$$\frac{(x+y)(x^2+3)}{8x}$$

$$8x$$

$$10) \frac{y(y+3)}{y^2 + 3y}$$

$$y^2 + y - 6$$

$$(y+3)(y-2)$$

$$\frac{2(y-2)}{y}$$

$$2y - 4$$

$$y$$

$$2$$

$$11) \frac{(x-3)(x-3)}{(x-3)^2} \div \frac{5y}{6x-18}$$

$$x$$

$$5y$$

$$6(x-3)$$

$$\frac{5(x-3)}{6}$$

$$6$$

Add/Subtract.

$$\begin{array}{r} (x-4) \frac{4x}{x+2} + \frac{-3(x+2)}{x-4} \end{array}$$

$$\frac{4x^2 - 16x - 3x - 6}{(x-4)(x+2)}$$

$$\frac{4x^2 - 19x - 6}{(x-4)(x+2)}$$

Solve.

$$14) \quad \frac{4}{8x-4} = \frac{x}{2x^2+2}$$

$$4(2x^2+2) = x(8x-4)$$

$$8x^2 + 8 = 8x^2 - 4x$$

$$8 = -4x$$

$$x = -2$$

$$15x - 2(2x-3)$$

$$13) \frac{5x}{2x+12} - \frac{2x-3}{3x+18} \cdot 2$$

$$3 \cdot \frac{2(x+6)}{3(x+6)} = 2$$

$$\frac{15x - 4x + 6}{6(x+6)}$$

$$\frac{11x + 6}{6(x+6)}$$

$$15) \frac{1}{5 \cdot 2x} - \frac{2 \cdot 2}{5x \cdot 2} = \frac{2 \cdot 10x}{10x}$$

$$\frac{5}{10x} - \frac{4}{10x} = \frac{20x}{10x}$$

$$1 = 20x$$

$$x = \frac{1}{20}$$

$$x = .05$$

- 16) Jeff and Shari are going to paint the garage for their parents this summer. Jeff could paint it in 3 hours and Shari would take 4. How long will it take to paint the garage if they work together?

$$\frac{1}{3} \quad \frac{1}{4}$$

$$x \quad x$$

$$\frac{x}{3} + \frac{x}{4} = 1$$

$$4x + 3x = 12$$

$$7x = 12$$

$$x = 1.7 \text{ hrs.}$$

Advanced Algebra Exam Review
Sequences & Series

Name Key

1. Identify whether each of the following is an arithmetic sequence, arithmetic series, geometric sequence, geometric series.

- a. $1 + 3 + 9 + 27 + \dots$ geom series
b. $3, 6, 9, 12, \dots$ arith seq
c. $28 + 26 + 24 + 22, \dots$ arith series
d. $64, 32, 16, 8, \dots$ geom seq

2. Write the first five terms for each sequence.

- a. $a_1 = 4$ and $d = 5$ 4, 9, 14, 19, 24
b. $a_1 = 2$ and $r = 3$ 2, 6, 18, 54, 162
c. $a_n = 3n - 2$ 1, 4, 7, 10, 13
d. $a_n = 2^n$ 2, 4, 8, 16, 32
e. $a_2 = 81$ and $r = -1/3$ -243, 81, -27, 9, -3

3. Find a_{24} for an arithmetic sequence in which $a_1 = 5$ and $d = 6$.

$$a_{24} = 5 + 6(24-1)$$

$$a_{24} = 143$$

4. Find a_7 for a geometric sequence in which $a_1 = 8$ and $r = 2$.

$$a_7 = 8(2)^{7-1}$$

$$a_7 = 512$$

5. Insert two geometric means between -2 and 128.

$$-2, \quad _, \quad _, \quad 128$$

$$128 = -2(r)^{4-1}$$

$$-64 = r^3 \quad r = -4$$

$$\boxed{+8, -32}$$

6. Find "d" for an arithmetic sequence where $a_1 = 3$ and $a_{21} = 83$.

$$83 = 3 + d(21-1)$$

$$80 = 20d$$

$$\boxed{d = 4}$$

7. Find the sum of the first 40 terms for the sequence 8, 12, 16, 20, ...

$$S_{40} = \frac{40}{2} [2(8) + (40-1)4]$$

$$20 [16 + 156]$$

$$\boxed{S_{40} = 3440}$$

8. Find the sum of an arithmetic series where $a_1 = -12$ and $a_{20} = 45$.

$$S_{20} = \frac{20}{2} [-12 + 45]$$

$$= 10(33)$$

$$\boxed{S_{20} = 330}$$

9. Find the first term in an arithmetic series if the sum of the first 21 terms is ~~83~~⁸⁴ and the difference is 4.

$$84 = \frac{21}{2} [2a_1 + 4(21-1)]$$

$$84 = 10.5(2a_1 + 80)$$

$$84 = 2a_1 + 80$$

$$\boxed{a_1 = 36}$$

10. Find the sum of the geometric series for which $a_1 = 8$, $r = -2$, and $n = 6$.

$$S_6 = \frac{8(1 - (-2)^6)}{1 - (-2)}$$

$$\boxed{S_6 = -168}$$

11. Determine whether each series converges or diverges.

a. $10 + 20 + 40 + \dots$

$r = 2$ diverges

b. $125 + 25 + 5 + \dots$

$r = \frac{1}{5}$ converges

12. Find the sum of the convergent series in problem 11.

$$S = \frac{125}{1 - \frac{1}{5}} = 156.25$$

Advanced Algebra Exam Review
Chapter Ten- Trig

Name

Key

Name the quadrant.

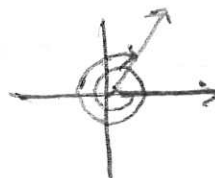
- 1) Where $\sin \alpha > 0$ and $\cos \alpha < 0$ II
- 2) Where the terminal side of a -455° angle lies III
- 3) Where $\tan < 0$ and $\csc > 0$ II
- 4) Where the terminal side of a 545° angle lies III

5) Find and draw the angle.

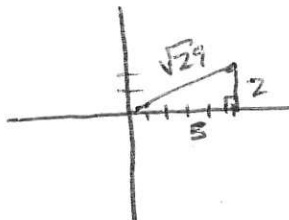
a. $7\pi/6^R$ 210°



b. $1 \frac{5}{6}$ revolutions clockwise -660°



6) Find all six trig functions if the terminal side of $\angle \alpha$ passes through $(5, 2)$.



$$\sin \alpha = \frac{2\sqrt{29}}{29}$$

$$\cos \alpha = \frac{5\sqrt{29}}{29}$$

$$\tan \alpha = \frac{2}{5}$$

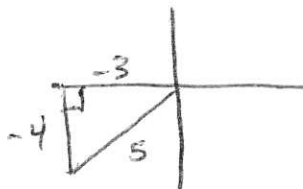
$$\cot \alpha = \frac{5}{2}$$

$$\sec \alpha = \frac{\sqrt{29}}{5}$$

$$\csc \alpha = \frac{\sqrt{29}}{2}$$

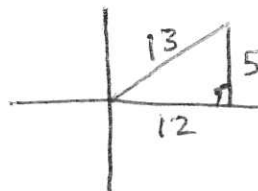
7) If $\cos \alpha = -3/5$ and α lies in quadrant III, find $\cot \alpha$.

$$\cot \alpha = \frac{3}{4}$$



8) If $\csc \alpha = 13/5$ and α lies in quadrant I, find $\tan \alpha$.

$$\tan \alpha = \frac{5}{12}$$



9) State the reference angle.

a. $\sin 210^\circ$ $-\sin 30^\circ$

b. $\cot 320^\circ$ $-\cot 40^\circ$

c. $\csc (-130^\circ)$ $-\csc 50^\circ$

10) Find the exact value.

a. $\cos 120^\circ$ $-\frac{1}{2}$

b. $\tan 270^\circ$ undef

c. $\sec 45^\circ$ $\sqrt{2}$

11) Find the radian measure.

a. 225° $\frac{5\pi}{4}$

b. 310° $\frac{31\pi}{18}$

c. 500° $\frac{25\pi}{9}$

12) Find the degree measure.

a. $4\pi^R$ 720°

b. $3\pi/4^R$ 135°

c. $11\pi/3^R$ 660°

13) State the amplitude and the period.

a. $y = 3\sin 4\theta$ $a=3$ $p=90^\circ$

b. $y = \frac{1}{2}\sin 8\theta$ $a=\frac{1}{2}$ $p=45^\circ$

c. $y = -\sin(1/3\theta)$ $a=1$ $p=1080$